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May 5, 2004

Alaska Department of Environmental Conservation
DSPAR Contaminated Sites Program
43335 Kalifornsky Beach Road, Suite 11
Soldotna, Alaska 99669

RE: Kenai Airport Fuel Service, Spill #90230026801 at UST Facility ID #2187
Interim Remedial Action Report #7
Installation and Sampling of Groundwater Monitoring Wells 12 and 13

Attention: Monica T. English, Environmental Specialist

This report documents the installation and sampling of two additional groundwater monitoring wells (MW) at the above referenced facility. MW12 and MW13 were installed to gather additional site characterization data to determine the east and west limits of the contamination plume, and for the design of the Soil Vapor Extraction/Air Sparging (SVE/AS) remediation system proposed for this site. Additionally, the installation of two soil vapor extraction (SVE) wells, SVE-North and SVE-South, and two vapor-monitoring points for a pilot study are documented. The pilot study was conducted to determine the spacing between the SVE and AS wells and to finalize the design of the SVE/AS system.

The work was performed in accordance with the document requesting *Authorization to Proceed with SVE Pilot Test*, dated April 2, 2004, which was submitted to the Alaska Department of Environmental Conservation (ADEC) – Kenai Office. Department approval for the SVE Pilot Study was received on April 6, 2004. The pilot study results, for department review and comment, were submitted to the department with the final workplan and design of the SVE/AS remedial system. Hughes Drilling of Soldotna, Alaska was contracted to perform the drilling services. The laboratory samples were sent to SGS/CT&E Environmental Services, Inc. of Anchorage, Alaska for analytical testing.

WELL BORING AND INSTALLATION

On Tuesday, April 13, 2004, the well boring and installation of two additional groundwater monitoring wells, MW12 and MW13, and two SVE wells, SVE-North and SVE-South, was conducted. The weather conditions were variable: overcast with northwesterly winds from 5-10 mph and temperatures ranging from 36° F in the morning to 45° F in the afternoon. The four wells were drilled west of the Alaska Flying Network (AFN) building and the locations are shown on Figure 1-4.

Hughes Drilling used a CME-75 hydraulic rotary drill rig for the groundwater monitoring wells and SVE wells. Before mobilizing to the site, Hughes Drilling steam cleaned the drilling equipment. The drill rig operators cut the asphalt with a 10" rotary cutter at the designated well

locations. The wells were drilled with 4.25-inch ID hollow-stem augers. Split-spoon samplers were cleaned before each use with a phosphate-free soap wash and two tap water rinses.

Soil samples were collected for field screening analysis at two-foot intervals beginning 2 feet below ground surface (bgs). Field screening consisted of characterizing the soil based on visual and olfactory inspection as well as using a calibrated photoionization detector (PID) for testing volatile hydrocarbon vapors. At MW12, soil samples were collected and field screened to 13.5 feet bgs, approximately 5 feet below the observed water table. At MW13, soil samples for field screening were collected to 14 feet bgs, approximately 6 feet below the observed water table. At MW13, soil boring continued to 26 feet to investigate for the presence of low-permeability soils (none was encountered) prior to installing the air sparging wells for the treatment system.

At both MW12 and MW13, soil samples were collected at groundwater for testing by the analytical laboratory. At MW12, petroleum contamination was detected in field screen samples collected above and below the water table, therefore, soil samples were also collected at those locations for analytical testing. Soil cuttings, from locations where petroleum contamination was detected, were placed in a 55-gallon drum that was covered and stored at the AFN building for future sampling and disposal. Clean soil cuttings were collected in a separate 55-gallon drum, and after examination by Ron Rozak confirmed the cuttings were not contaminated, the soil was spread along the fence line just west of the evaporation pond.

After drilling the designated well to the appropriate depth, the engineer evaluated the field data, and the drillers installed the wells. Each well casing was installed inside the augers to the bottom of the boring. Wells were constructed of 2-inch ID Schedule-40 polyvinyl chloride (PVC) pipe with flush threaded connections and a concave screw cap at the bottom. The lower portion of the well was PVC screen with 0.020-inch slots. For MW12 and MW13, the screen extended 7 feet above the bottom cap. For SVE-North and SVE-South, the screen was 3 feet above the cap.

A continuous sand pack consisting of #10-#20 silica filter sand was used to backfill around the well screen from the bottom of hole (BOH) to approximately 6 inches above the top of screen. For MW12 and MW13, hydrated bentonite chips were placed to seal the remainder of the interstitial borehole space to about 2 feet bgs. For the SVE wells, the chips were placed to about 1 foot bgs. At MW12 and MW13, a 10-inch diameter security casing, with a flush-mount cover, was placed over the PVC riser. The SVE wells were covered with a traffic-rated 24-inch diameter manhole assembly. The attached well boring and installation logs provide detailed information on the soil type, field screening, and monitoring well design. SVE-North will be one of the SVE wells in the treatment system and SVE-South will be a vapor sampling point. The well locations indicated on Figure 1-4 and soil boring logs are included in the attachments.

GROUNDWATER SAMPLING AND VAPOR MONITORING POINT INSTALLATION

On Wednesday, April 14, 2004, Rozak Engineering manually developed MW12 and MW13 and collected groundwater samples for analytical testing. The weather conditions were clear skies with southwesterly winds from 10 to 15 mph and temperatures around 40° F. A Solinst water level meter with an accuracy to within 0.01-foot was used to measure the static water levels (SWL) at four groundwater monitoring wells. SWL was measured from the top of each PVC

well casing to the water surface at the two new monitoring wells (MW12 and MW13) and at MW1 and MW6, north of the evaporation pond, to provide the groundwater elevation contours as indicated on Figure 2. After each SWL measurement, the probe and tape were decontaminated with a phosphate-free wash solution and rinsed with tap water.

Monitoring Well Development

The new monitoring wells were developed using stainless steel one-liter bailers to remove fine-grained materials from the screened formation. Water generated during well development was collected in five-gallon plastic buckets. The amount of water generated during development was approximately 65 gallons for MW12 and approximately 55 gallons for MW13. The purge water was characterized based on visual and olfactory inspection.

Water from MW12 was brown in color and changed to a lighter brown after purging 40 gallons. There was no detectable PHC odor or sheen. The sediment of fine gray sand lessened to approximately 1/2 to 1/3 cup after purging 15 gallons of water, but that amount consistently remained in the bottom of the bucket to 65 gallons. Grains of silica sand were noticed in the bottom of the bucket of the last 5 gallons. This suggests the cap separated from the bottom of the screen or perhaps the PVC screen is cracked. Water from MW13 was brown in color with no detectable PHC odor or sheen. Less than one tablespoon of fine gray sand remained in the bottom of the bucket at the end of developing the well. After examination by Ron Rozak confirmed there was no fuel sheen or odor in the buckets, the purge water was spread (to evaporate) over the surface of the tarmac away from monitoring wells and airport activity.

Hughes Drilling installed two vapor monitoring points between SVE-South and SVE-North. The vapor monitoring points were driven 5 feet below ground surface using a Simco Model 2400 vibratory drill rig. The vapor monitoring points consisted of a 1 ¼-inch OD steel pipe with a tapered drive point and sixteen laser slots (0.015" wide by 2" long) cut in a uniform pattern in the bottom 2 feet above the bottom point. A hose barb and valve was attached to the top of the pipe and a 10" diameter security casing was grouted at the surface. The vapor monitoring point locations are shown on Figure 1-4. David Thomas, of Kent and Sullivan, Inc., arrived after the monitoring points were installed and discussed the pilot test and the air sample activities to be conducted the following day.

Groundwater Sampling

After allowing sediment to settle and water to recover to their static levels, we collected groundwater samples for analytical testing from MW12 and MW13. Samples were collected with pre-cleaned disposable, polyethylene one-liter bailers and cord. The bailer was slowly lowered into the water to minimize disturbance to the water during sampling. Water samples were quickly placed in laboratory-supplied containers and stored in a chilled cooler for delivery to the laboratory. After collecting the samples the monitoring wells were secured.

Groundwater Survey

On Sunday, April 25, 2004, Rozak Engineering conducted a horizontal and vertical survey of the well casings of MWs 1, 6, 12, and 13. The horizontal survey tied in the new wells (MW12 and

MW13) with the existing MWs and the AFN building to an accuracy of plus or minus one foot. The elevation survey closed within the desired accuracy of 0.01 foot. Elevations were measured relative to a temporary bench mark (TBM) of 100.00 feet previously assigned to the concrete slab surface north of the southwest door of the AFN building. Groundwater elevations were determined by subtracting the SWL measurements from the elevations established at the top of the PVC risers at the monitoring wells. Survey field notes are included in the attachments. The elevation results are listed in *Table 3 - Summary of Groundwater Survey* and shown on Figure 2.

SAMPLING PROCEDURES

Field screening and laboratory sampling were conducted in accordance with the work plan approved by the Alaska Department of Environmental Conservation (ADEC) and with the ADEC *Standard Sampling Procedures*. Soil and water samples were collected and stored in appropriately chilled coolers and transported to the laboratory for analytical testing under proper chain of custody procedures. Under the sample numbering scheme used for this project, a typical sample number is KAFS-04-01. The KAFS-04 indicates the job prefix, assigned by Rozak Engineering, and the last two digits of the year. A discrete consecutive sample number follows the prefix "KAFS-04", and the suffix "S" or "W" indicates a soil or water sample.

LABORATORY ANALYSIS AND QUALITY CONTROL

Analytical Testing Procedures

The samples collected during this project were handled and preserved in accordance with the ADEC Procedures Manual. Samples were sent under chain-of-custody to SGS/CT&E Environmental Services, Inc. in Anchorage for analytical testing. All samples were analyzed for gasoline range organics (GRO) by Alaska method AK 101 and volatile organic compounds (BTEX) by EPA method 8021B. Moisture content was also determined. A copy of the laboratory's *Level 1 Data Report* and analytical results are included in the attachments.

Discussion of Analytical Results

As stated in the *Level 1 Data Report*, the laboratory's internal data quality objectives for this project were met. At MW12, the analytical results for the three samples collected at different depths contained benzene levels that exceed cleanup standards. Additionally, KAFS-04-02S, the sample collected from MW12 at 9 feet, just below observed groundwater, contained GRO levels and BTEX levels in excess of cleanup standards. At MW13, the soil analytical results for GRO and BTEX were below cleanup standards.

At MW12, the groundwater analytical results showed PHC levels in excess of cleanup standards for GRO, benzene, toluene and ethylbenzene. This suggests the eastern edge of the groundwater contamination extends near the west side of the AFN building, and possibly beneath the building. This is consistent with the contamination boundaries developed from previous events. At MW13, the groundwater analytical results showed PHC was present, but at levels less than cleanup standards. Soil and groundwater analysis results indicate MW13 is located near the western edge of the contamination plume. Tables 1 and 2 summarize the test results for soil and water samples.

CONCLUSIONS AND RECOMMENDATIONS

Groundwater contamination levels at MW12 and MW13 should be monitored during the operation of the SVE/AS remedial system. Future groundwater monitoring at these locations is included in *Section 5.2.5 Groundwater Levels and Sampling*, of the *Remedial Action Work Plan #2R* dated April 2004, and summarized as follows: groundwater levels will be measured during system startup, whenever vapor concentrations are tested, and during long-term monitoring. Sampling events will occur at three, six, and 18-month intervals after system startup. After the 18 month sampling event, the analytical data will be evaluated to determine further sampling programs and schedule. Laboratory samples will be submitted for GRO and BTEX analyses.

CLOSURE

The services described in this report were performed in general accordance with the plans referenced herein and the standard of care and diligence normally practiced by recognized consulting firms in performing services of a similar nature. To the best of my knowledge and belief, the information contained in this report is true, accurate, and complete.

Prepared by,

Ronald T. Rozak, PE
Principal Investigator

cc: Dean Eichholz, Dan Pitts, Mark Prieksat
Scott Pexton, ADEC DSPAR Response Fund Administration Program

Attachments

Figure 1-4 – Site Map
Figure 2 – Groundwater Elevation Contours
Table 1 – Summary of Test Results for Soil Samples
Table 2 – Summary of Test Results for Water Samples
Table 3 – Summary of Groundwater Survey
Survey Field Notes
Soil Boring Logs
Level 1 Data Report and Analytical Results

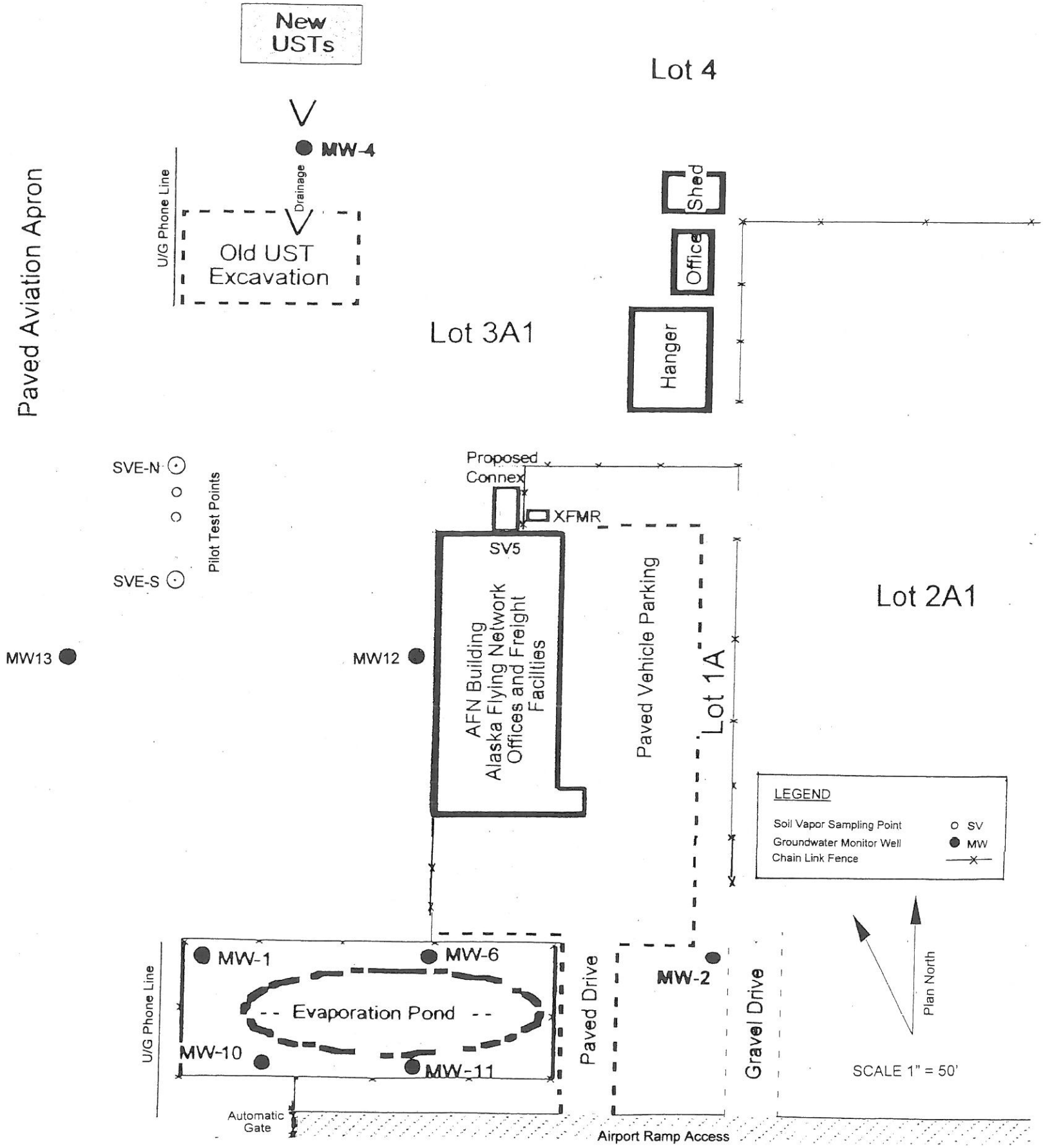


Figure 1-4. SITE MAP WITH MONITORING WELLS AND PILOT TEST POINTS

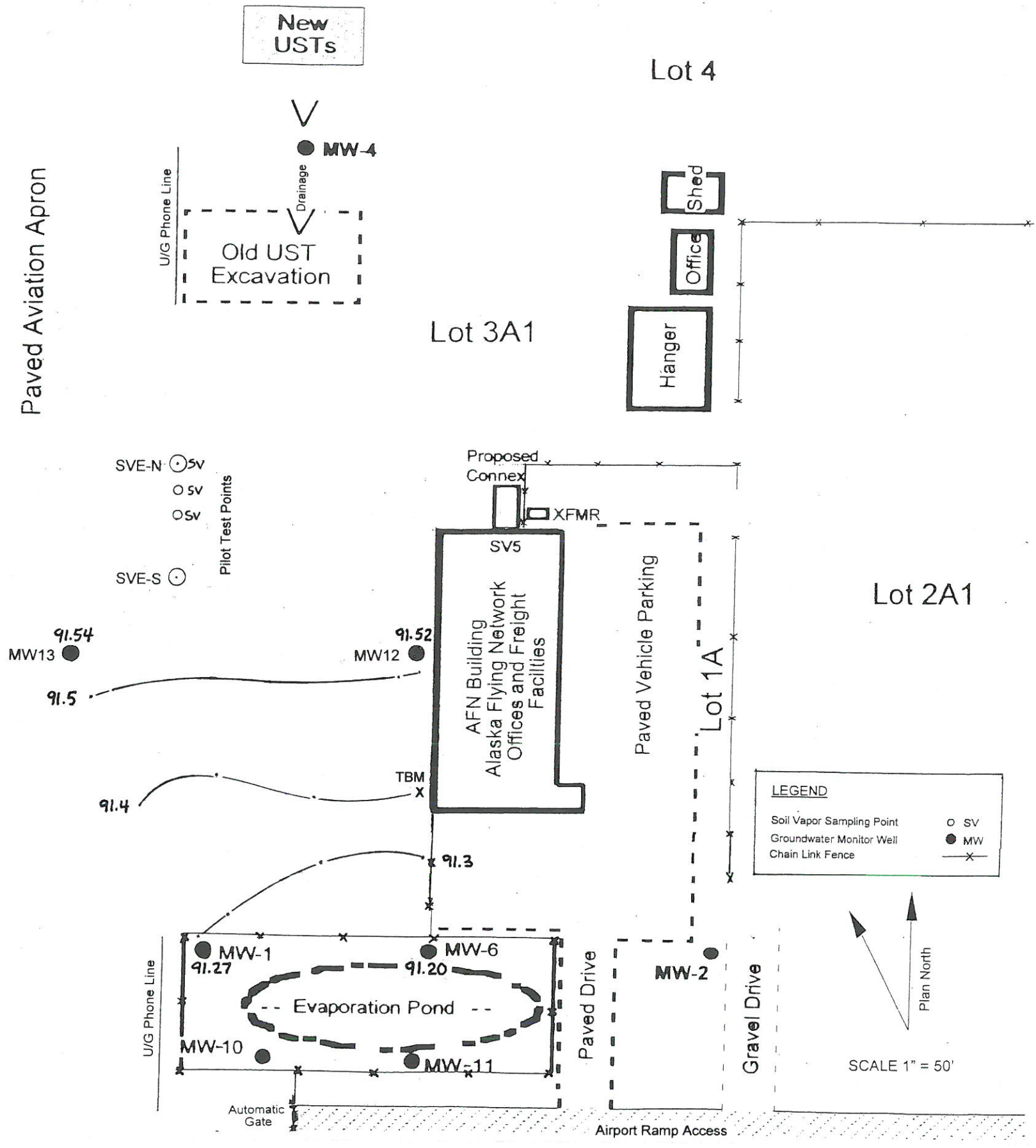


Figure 2. GROUNDWATER ELEVATION CONTOURS – APRIL 14, 2004

TABLE 1 – SUMMARY OF TEST RESULTS FOR SOIL BORINGS

Sampling Date: April 13, 2004

Sample ID# KAFS-04-	Sample Location	Moisture Content %	PID ppm	GRO mg/kg	Benzene mg/kg
01S	MW12 @ 7'	5.8	116	1.41U[1]	0.052[2]
02S	MW12 @ 9'	21.1	877	771	1.89
03S	MW12 @ 12'	19.9	139	1.24	0.023
04S	MW13 @ 11'	21.1	467	1.33	0.007
Method Two Table B2 Soil Cleanup Levels				**300**	**0.020**

[1] – the parameter was tested for but not detected at the concentration shown
[2] – shaded values exceed the cleanup level

TABLE 2 – SUMMARY OF TEST RESULTS FOR GROUNDWATER SAMPLES

Sampling Date: April 14, 2004

Sample ID# KAFS-04-	Sample Location	GRO mg/kg	Benzene mg/kg
05W	MW12	71.0[1]	3.19
06W	MW13	0.29	0.0006
Method Two Groundwater Cleanup Levels		**1.3**	**0.005**

[1] – shaded values exceed the cleanup level

TABLE 3 - SUMMARY OF GROUNDWATER SURVEY
Static Water Level Measurements on April 14, 2004

Monitoring Well	Top of Casing Elevation (feet)	Depth of Water (top of casing) (feet)	Groundwater Elevation (feet)
MW-1	100.15	8.88	91.27
MW-6	100.02	8.82	91.20
MW-12	100.32	7.76	92.56
MW-13	100.36	8.82	91.54

KAFS GW Monitor Well Survey

STA.	+	HI	−	ELEV.	
TBM	7.10	107.10		100.00	
MW6			7.08	100.02	←
MW1			6.95	100.15	←
			− 8.23	91.92	
MW12			7.30	99.80	
S49, W6			+0.52		
			7.82 ⇒	99.28	
MW13			6.74	100.36	←
S52, W146			− 8.12	92.24	
TBM			7.10	100.00	

cldy, 5-10 mph — 4-25-04 430 pm

spectra physics Level — R.T. ROZAK

CR-16 Fglass xtnd rod — π 30' West of MW13

Top Conc Slab North of SW door AFN Bldg.

Top PVC North side

Top PVC North
Top PVC → SWL

ON PVMT 2.0' SOUTH OF MW
ON PVMT → Top PVCN ⇒ SWL

Top PVC NORTH
Top PVC → SWL

STATE OF ALASKA
49TH
Ronald T. Rozak
CE 5649
Ronald T. Rozak
REGISTERED PROFESSIONAL ENGINEER

530

PROJECT: KAFS - SC / RI

SOIL BORING: MW 12

LEGEND

ATD = AT TIME OF DRILLING
BOH = BOTTOM OF HOLE
SWL = STATIC WATER LEVEL
▼ = WATER TABLE
[F] = FIELD SAMPLE
[L] = LAB SAMPLE
[D] = DEXIL PETROFLAG SAMPLE
| | = SPLIT SPOON SAMPLE

DATE DRILLED: 4/13/04 TIME: START 0915 FINISH 1030

DRILLING COMPANY: HUGHES DRILLING PAT & CODY

DRILLING METHOD: HOLLOW-STEM ROTARY, CME-75

INSPECTOR(S): RON ROZAK, MARY WHITELEY

☐ PHOTOVAC HL-2000 ☒ TEI 580 B = 99 ppm @ 0925

PID (ppm) COLD / WARM	GRD. WATER	DEPTH (ft)	SAMPLE LOC.	SAMPLE TIME	SAMPLE ID.	BLOWS/FT @ 340# Blow	MATERIALS DESCRIPTION AND REMARKS	ODOR N L M H	USCS
							WG, S 52 FROM NW COR AFN		
							TOP PVC 0.49'		
							18" ASPHALT		
		2							
0		4	F	0930		7 10 7 6	GRAVEL GRAVELLY SAND, SOFT FROST	X	
176		5 6	F	0940		2 3 3 5	BROWN LOAM (4.5)	?	
							TO 6.3		
116		8	F/L	0950	KAFS-04-01	5 7 8 9	MED. OLIVE SAND 7.5 SPKLD GRAY SAND	SL	
877	▽	8.5 10	F/L	1000	KAFS 04-02	2 7 6 7	SPKLD GRAY MED SAND WET @ 8.5	X	
366			F	1015		3 4 4 5		X	
139		12	F/L		KAFS 04-03	4 5			
0		14	F	1025		11	BOH @ 13.5	X	
		15							
		20							
		25							

MW.WELL 12

SS COLLAR
FLUSH MOUNT LID
CEMENT
BENTONITE CHIPS
CHIPS
SAND
SLOTTED SCREEN 0.020
10-20 SILICA SAND
CAP
12.5' PVC
BOTTOM OF MW @ 13'

PROJECT: KAFS - SC / RI **SOIL BORING:** MW 13

LEGEND
ATD = AT TIME OF DRILLING
BOH = BOTTOM OF HOLE
SWL = STATIC WATER LEVEL
▼ = WATER TABLE
F = FIELD SAMPLE
L = LAB SAMPLE
D = DEXIL PETROFLAG SAMPLE
| | = SPLIT SPOON SAMPLE

DATE DRILLED: 4/13/04 TIME: START 1125 FINISH 1325
DRILLING COMPANY: HUGHES DRILLING PAT & CODY
DRILLING METHOD: HOLLOW STEM ROTARY - CME-75
INSPECTOR(S): RON ROZAK, MARY WHITELEY
☐ PHOTOVAC HL-2000 ☒ TEI 580 B 99 ppm @ 0925

W 145', S 52' FROM NW COR AFN

TOP PVC 0.48'

PID (ppm) COLD	PID (ppm) WARM	GRD. WATER	DEPTH (ft)	SAMPLE LOC.	SAMPLE TIME	SAMPLE ID.	BLOWS/FT @340#/BLOW	MATERIALS DESCRIPTION AND REMARKS	ODOR N	ODOR L	ODOR M	ODOR H	USCS
			2					4½" ASPHALT					
								GRAVEL, BRN (CRUSHED)					
	0		4	F	1135		5 12 19 23	MED GRAVEL OLIVE — SOFT FROST SAND - OLIVE BRN	X				
	0		5 6	F	1140		12 18 21 18	GRAVELLY SAND - OLIVE BRN	X				
	0		8	F	1150		4 8 9 11	SAND - OLIVE	X				
	0	▼	9.3 10	F	1200		4 6 6 7	(MOIST)	X				
26 175	56 467		12	F/L	1210	KAFS-04-04	2 4 5 6	GRAVELLY SAND - OLIVE BRN (WET)		X			
0	0		14	F	1220		1 2 2 5	MED. COARSE SAND - SPKLD W/ BRN	X				
0	0		15 16	F	1230		6 3 6		X				
	NOT TESTED		18		1245		12 4 21	GVLY M-CRSE SAND, RED/BRN	X				
			20		1255		8 5 14	Med. sand, olive	X				
			22		1305		8 11 15	F-M sand olive	X				
			24		1315		3 9 15	F-M Sand gray F-M sand olive	X				
			25 26		1325		5 10 14	F-M Sand Gray BOH	X				

MW.WELL 13

SS COLLAR
FLUSH MOUNT STEEL LID
CEMENT
CEMENT
CHIPS
BENTONITE CHIPS
SAND
0.020 SLOTTED SCREEN
10-20 SILICA SAND
CAP

BOTTOM OF MW @ 14'

PROJECT: KAFS- SC/RI **SOIL BORING:** SVE-SOUTH

LEGEND
ATD = AT TIME OF DRILLING
BOH = BOTTOM OF HOLE
SWL = STATIC WATER LEVEL
▼ = WATER TABLE
F = FIELD SAMPLE
L = LAB SAMPLE
D = DEXIL PETROFLAG SAMPLE
II = SPLIT SPOON SAMPLE

DATE DRILLED: 4/13/04 TIME: START 1600 FINISH 1630

DRILLING COMPANY: HUGHES DRILLING

DRILLING METHOD: HOLLOW STEM ROTARY - CME 75

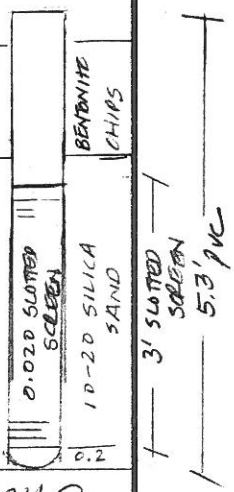
INSPECTOR(S): RON ROZAK, MARY WHITELEY

☐ PHOTOVAC HL-2000 ☒ TEI 580 B 99ppm @ 0925

PID (ppm) COLD	PID (ppm) WARM	GRD. WATER	DEPTH (ft)	SAMPLE LOC.	SAMPLE TIME	SAMPLE ID.	BLOWS/FT	MATERIALS DESCRIPTION AND REMARKS	ODOR N L M H	USCS
								W 103', S 20' FROM NW COR AFN		
								3" ASPHALT		
			1							
			2							
			3							
			4							
0	0		5	F	1625			SAND-OLIVE	X	
								BOH		
			6							

SVE-S

24" DIA. MANHOLE ASSEMBLY



BOH @ 5½'

(SAND: BOH TO 6" ABOVE SCREEN)

PROJECT: KAFS - SC / RI

SOIL BORING: SVE-NORTH

LEGEND

ATD = AT TIME OF DRILLING
BOH = BOTTOM OF HOLE
SWL = STATIC WATER LEVEL
▼ = WATER TABLE
F = FIELD SAMPLE
L = LAB SAMPLE
D = DEXIL PETROFLAG SAMPLE
| | = SPLIT SPOON SAMPLE

DATE DRILLED: 4/13/04 TIME: START 1635 FINISH 1700

DRILLING COMPANY: HUGHES DRILLING - PAT & COPY

DRILLING METHOD: HOLLOW STEM ROTARY CME-75

INSPECTOR(S): RON ROZAK, MARY WHITELY

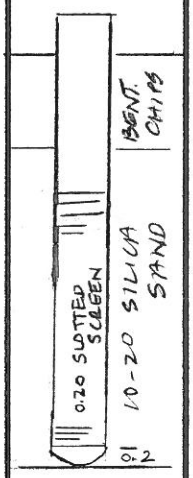
☐ PHOTOVAC HL-2000 ☒ TEI 580 B 99ppm @ 0925

PID (ppm) COLD	PID (ppm) WARM	GRD. WATER	DEPTH (ft)	SAMPLE LOC.	SAMPLE TIME	SAMPLE ID.	BLOWS/FT	MATERIALS DESCRIPTION AND REMARKS	ODOR N L M H	USCS
			1					3½" ASPHALT		
			2							
			3							
			4							
12	22		5		1700			SAND - OLIVE	SL	
								BOH		
			6							

W 103', N 25' FROM NW COR AFN

SVE-N

24" DIA MAN HOLE ASSEMBLY



BOH @ 5½'

(SAND; BOH TO 6" ABOVE SCREEN)